TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

TestAmerica Job ID: 160-6999-1
Client Project/Site: Beta Chem site, Lenexa, KS

For:
Tetra Tech EM Inc.
415 Oak Street
Kansas City, Missouri 64106

Attn: Danny O'Connor

Authorized for release by:
6/24/2014 4:38:31 PM

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Job ID: 160-6999-1

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Tetra Tech EM Inc.

Project: Beta Chem site, Lenexa, KS

Report Number: 160-6999-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 6/9/2014 9:15 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 21.1° C.

CARBON-14 BY LSC

Samples BG-1 (160-6999-1), BG-2 (160-6999-2), BG-3 (160-6999-3), BG-4 (160-6999-4) and BG-5 (160-6999-5) were analyzed for Carbon-14 by LSC in accordance with EERF C-01. The samples were prepared on 06/17/2014 and analyzed on 06/18/2014.

The carbon 14 soil samples are non-homogeneous. They ran "as received" and were not dried and ground. Sample contain small rocks, roots, and some samples are mud: BG-1 (160-6999-1), BG-2 (160-6999-2), BG-3 (160-6999-3), BG-4 (160-6999-4), BG-5 (160-6999-5).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Job ID: 160-6999-1 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

CHAIN-OF-CUSTODY RECORD

TETRA TECH EM INC.
8030 Flint Street
Lenexa, Kansas 66214
(913) 894-2600

Date: 6-6-14
Page: 1 of 1
Project No: X9025140061
Shipment Method: FedEx
Number of Coolers Shipped: 1

Project Name: Beta - Chem
Project Manager: Danny O'Connor
Sampler: (Signature)

Sample Number:	Date:	Time:	Analyses (Preservative)	Matrix Type	No. of Containers	Laboratory Comments:
BG-1	5-30-14	1205	X	S	1	
BG-2	"	1211	X	S	1	
BG-3	"	1214	X	S	1	
BG-4	"	1217	X	S	1	
BG-5	"	1220	X	S	1	

Analyses (Preservative): 6-HI via Liquid Scintillation Counter

Turn-around Time Requested: Standard

160-6999 Chain of Custody

Matrix: S = Soil M = Sediment W = Water A = Air
Preservatives: 1 = Ice 2 = HCl 3 = H_2SO_4 4 = NaOH 5 = HNO_3

Relinquished By: (Signature)	Received By: (Signature)	Date:	Time:
	Jill Clarke	6.9.14	0915
Relinquished By: (Signature)	Received By: (Signature)	Date:	Time:
Relinquished By: (Signature)	Received By: (Signature)	Date:	Time:

White = Tetra Tech Yellow = Laboratory Pink = Return to Tetra Tech

Login Sample Receipt Checklist

Client: Tetra Tech EM Inc.

Job Number: 160-6999-1

Login Number: 6999

List Number: 1

Creator: Clarke, Jill C

List Source: TestAmerica St. Louis

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	N/A	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Client: Tetra Tech EM Inc.
Project/Site: Beta Chem site, Lenexa, KS

TestAmerica Job ID: 160-6999-1

Qualifiers

Rad

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Method Summary

Client: Tetra Tech EM Inc.
Project/Site: Beta Chem site, Lenexa, KS

TestAmerica Job ID: 160-6999-1

Method	Method Description	Protocol	Laboratory
C-01-1	Carbon-14 (EERF C-01-1)	EERF	TAL SL

Protocol References:

EERF = EERF

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: Tetra Tech EM Inc.
Project/Site: Beta Chem site, Lenexa, KS

TestAmerica Job ID: 160-6999-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-6999-1	BG-1	Solid	05/30/14 12:05	06/09/14 09:15
160-6999-2	BG-2	Solid	05/30/14 12:11	06/09/14 09:15
160-6999-3	BG-3	Solid	05/30/14 12:14	06/09/14 09:15
160-6999-4	BG-4	Solid	05/30/14 12:17	06/09/14 09:15
160-6999-5	BG-5	Solid	05/30/14 12:20	06/09/14 09:15

Client Sample ID: BG-1 — **Lab Sample ID: 160-6999-1**
Date Collected: 05/30/14 12:05 — **Matrix: Solid**
Date Received: 06/09/14 09:15

Method: C-01-1 - Carbon-14 (EERF C-01-1)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Carbon-14	0.510	U	0.804	0.806	5.00	1.36	pCi/g	06/17/14 19:02	06/18/14 07:01	1

Client Sample ID: BG-2 — **Lab Sample ID: 160-6999-2**
Date Collected: 05/30/14 12:11 — **Matrix: Solid**
Date Received: 06/09/14 09:15

Method: C-01-1 - Carbon-14 (EERF C-01-1)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Carbon-14	0.254	U	0.832	0.832	5.00	1.44	pCi/g	06/17/14 19:02	06/18/14 07:25	1

Client Sample ID: BG-3 — **Lab Sample ID: 160-6999-3**
Date Collected: 05/30/14 12:14 — **Matrix: Solid**
Date Received: 06/09/14 09:15

Method: C-01-1 - Carbon-14 (EERF C-01-1)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Carbon-14	0.0362	U	0.721	0.721	5.00	1.27	pCi/g	06/17/14 19:02	06/18/14 07:49	1

Client Sample ID: BG-4 — **Lab Sample ID: 160-6999-4**
Date Collected: 05/30/14 12:17 — **Matrix: Solid**
Date Received: 06/09/14 09:15

Method: C-01-1 - Carbon-14 (EERF C-01-1)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Carbon-14	0.247	U	0.811	0.811	5.00	1.40	pCi/g	06/17/14 19:02	06/18/14 08:13	1

Client Sample ID: BG-5 — **Lab Sample ID: 160-6999-5**
Date Collected: 05/30/14 12:20 — **Matrix: Solid**
Date Received: 06/09/14 09:15

Method: C-01-1 - Carbon-14 (EERF C-01-1)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Carbon-14	0.432	U	0.818	0.819	5.00	1.38	pCi/g	06/17/14 19:02	06/18/14 08:37	1

Client: Tetra Tech EM Inc.
Project/Site: Beta Chem site, Lenexa, KS

TestAmerica Job ID: 160-6999-1

Method: C-01-1 - Carbon-14 (EERF C-01-1)

Lab Sample ID: MB 160-127248/1-A
Matrix: Solid
Analysis Batch: 127418

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 127248

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Carbon-14	-0.2477	U	0.791	0.791	5.00	1.43	pCi/g	06/17/14 19:02	06/18/14 02:13	1

Lab Sample ID: LCS 160-127248/2-A
Matrix: Solid
Analysis Batch: 127418

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 127248

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec. Limits		
Carbon-14			84.4	81.55		9.36	5.00	1.37	pCi/g	97	67 - 124		

QC Association Summary

Client: Tetra Tech EM Inc.
Project/Site: Beta Chem site, Lenexa, KS

TestAmerica Job ID: 160-6999-1

Rad

Prep Batch: 127248

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-6999-1	BG-1	Total/NA	Solid	LSC_Dist_Susp	
160-6999-2	BG-2	Total/NA	Solid	LSC_Dist_Susp	
160-6999-3	BG-3	Total/NA	Solid	LSC_Dist_Susp	
160-6999-4	BG-4	Total/NA	Solid	LSC_Dist_Susp	
160-6999-5	BG-5	Total/NA	Solid	LSC_Dist_Susp	
LCS 160-127248/2-A	Lab Control Sample	Total/NA	Solid	LSC_Dist_Susp	
MB 160-127248/1-A	Method Blank	Total/NA	Solid	LSC_Dist_Susp	